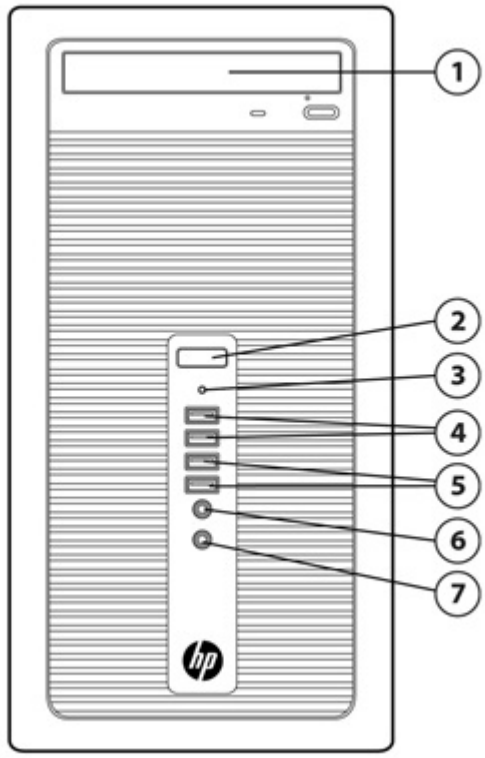
Overview



1. Drive bay supporting an optical disk drive (optional)
2. Power button
3. PC status LED
4. (2) USB 2.0 ports (black)
5. (2) USB 3.0 ports (blue)
6. 3.5mm microphone jack
7. 3.5mm headphone output

Not Shown

5.25" External Drive Half-Height Drive Bay (located behind removable bezel)
3.5" external drive bay; used for installing a Media Card Reader

Slots	(1) PCI Express x16 graphics connectors; (3) PCI Express x1 accessory connectors (1) USB 2.0 header for media card reader (1) Parallel port (optional)
Bays	(2) 3.5" internal storage drive bays
Rear I/O	(4) USB 2.0 ports

Overview

(1) VGA video port; (1) DVI-D video port)
(1) RJ-45 network connector
(1) RS-232 serial port
(1) RS-232 serial (optional)
3.5mm audio in/out jacks
PS/2 keyboard and mouse ports

Overview

At A Glance

- Expandable, upgradable chassis and system board
- HP developed and engineered UEFI BIOS supporting security, manageability and software image stability
- AMD Radeon HD 8240 Integrated Graphics (w/ AMD E1-2500 APU)
- AMD Radeon HD 8330 Integrated Graphics (w/ AMD A4-5000 APU
- AMD Radeon HD 8400 Integrated Graphics (w/ AMD A6-5200 APU
- Realtek RTL8151GH-CG GbE LOM integrated network connection
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Multi-independent monitor support via VGA and DVI-D video interfaces
- Discrete graphics options available for all platforms
- DTS Sound + audio management software
- Standard and high efficiency energy saving power supply options
- ENERGY STAR® qualified models certified EPEAT® Gold

Standard Features and Configurable Components (availability may vary by country)

OPERATING SYSTEM

Preinstalled When Purchased

Windows 8.1 Pro (64-bit)
Windows 8.1 (64-bit)
Windows 7 Ultimate (32-bit)**
Windows 7 Ultimate (64-bit)**
Windows 7 Professional (32-bit)**
Windows 7 Professional (64-bit)**
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8.1 Pro)***
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8.1 Pro)***
Windows 7 Home Premium (32-bit)**
Windows 7 Home Premium (64-bit)**
Windows 7 Home Basic (32-bit)**

FreeDOS 2.0
Novell SUSE Linux Enterprise Desktop 11

*Not all features are available in all editions of Windows 8.1. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8.1 functionality. See http://www.microsoft.com.

**Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.

***This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

PROCESSORS

AMD Quad-Core A6 APU with AMD Radeon™ HD Graphics

AMD Quad-Core A6-5200 Accelerated Processor with AMD Radeon™ HD 8400 Discrete-Class Graphics (2.0GHz 2MB L2 cache, 25W)

AMD Quad-Core A4 APU with AMD Radeon™ HD Graphics

AMD Quad-Core A4-5000 Accelerated Processor with AMD Radeon™ HD 8330 Discrete-Class Graphics (1.5GHz 2MB L2 cache, 15W)

AMD Dual-Core E1 APU with AMD Radeon™ HD Graphics

AMD Dual-Core E1-2500 Accelerated Processor with AMD Radeon™ HD 8240 Discrete-Class Graphics (1.4GHz 1MB L2 cache, 15W)

Standard Features and Configurable Components (availability may vary by country)

GRAPHICS

AMD Radeon HD Graphics (integrated on processor)

- Integrated AMD Radeon HD 8240, 8330 or 8400 Graphics depending on processor

AMD Radeon HD 8350 (1GB) FH PCIe x16

AMD Radeon HD 8350 (1GB) PCIe x16

AMD Radeon HD 8470 (2GB) FH

AMD Radeon HD 8490 (1GB) PCIe x16

NVIDIA GeForce GT630 (2GB) FH PCIe x16

NVIDIA NVS 310 x16 1st (no cbl)

NVIDIA NVS 315 (1GB) PCIe x1

ADAPTERS AND CABLES

HP DMS-59 to Dual DisplayPort Cable
HP DMS-59 to Dual DVI Cable
HP DMS-59 to Dual VGA Cable
HP DisplayPort to DisplayPort Cable
HP DisplayPort to DVI-D Adapter
HP DisplayPort to HDMI Adapter
HP DisplayPort to VGA Adapter
HP Serial Port Adapter
HP Parallel Port Adapter
HP DisplayPort Cable

STORAGE

SATA Drives

1 TB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5"
2 TB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5"

Hybrid Drives

500 GB SATA 6G 2.5 (8GB cache) SSHD Drive

500 GB SATA 6G 2.5 2nd Drive (8 GB cache)
(with 3.5" adapter)

1 TB SATA 6G 2.5 (8 GB cache) SSHD Drive

1 TB SATA 6G 2.5 2nd Drive (8 GB cache) SSHD Drive
(with 3.5" adapter)

Solid State Drives

128 GB SATA 6G 2.5 SSD
(with 3.5" adapter)

128 GB SATA 6G 2.5 2nd SSD
(with 3.5" adapter)

Standard Features and Configurable Components (availability may vary by country)

Self-encrypting Solid State Drive

120 GB SATA 2.5" Opal1 (SED) Solid State Drive with caddy

180 GB SATA 2.5" Opal1 (SED) Solid State Drive with caddy

256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive (with 3.5" adapter)

256GB SATA 2.5" 2nd Self-Encrypting (SED) Solid State Drive installed w/caddy

Optical Disc Drives

Blu-ray BDXL Writer

SuperMulti DVD Writer

DVD-ROM

Media Card Reader

15-in-1 USB2/3 Media Card Reader

MEMORY

Form Factor	Type	Maximum	# of Slots
Microtower	DDR3 non-ECC Up to 1600 MT/s	16 GB	2 UDIMM

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Memory modules support data transfer rates up to 1600 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)

Realtek RTL8151GH-CG GbE LOM (standard)

Intel Ethernet I210-T1 PCIe x1 Gb Network Interface Card (optional)

Wireless

Intel® Dual Band Wireless-N 7260 802.11 a/b/g/n PCI Express (optional)[1]

[1] Intel® Dual Band Wireless-N 7260 planned to be available December, 2013.

Standard Features and Configurable Components (availability may vary by country)

AUDIO/MULTIMEDIA

HD audio with Realtek ALC221 codec (all ports are stereo)

DTS Studio Sound audio management technology

Microphone and headphone front ports (3.5mm)

Line-out and Line-In rear Ports (3.5mm)

Multi-streaming capable

Internal speaker (standard)

KEYBOARDS AND POINTING DEVICES

Keyboard

HP PS/2 Keyboard

HP USB Keyboard

USB Smart Card (CCID) Keyboard

HP USB and PS/2 Washable Keyboard

HP Wireless Keyboard and Mouse Combo*
*Keyboard contains 25% post-consumer recycled plastic material

Mice

HP PS/2 Mouse

HP USB Mouse

HP USB 1000dpi Laser Mouse

HP USB and PS/2 Washable Mouse

HP BIOS

Key features of the HP BIOS include:

- Thermal and power management - The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance - Industry leading acoustic emissions across the range of operating conditions.
- Serviceability - HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery - HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS, BIOS updates from within Windows, HP Client Manager, and fail-safe recovery if updates are interrupted.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features:

- Administrator password - Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS
- Advanced Configuration and Power Interface (ACPI) - Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage.

Standard Features and Configurable Components (availability may vary by country)

- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

MANAGEABILITY

Fully manageable and supported by industry-standard HP Client Management Solutions. Optional LANDesk management tools simplify mobile device management and security. Simplify everything from deployment or migration to daily management, security, licensing, and more-and stop downtime before it starts.

- Hardware Management: Inventory, Device config and BIOS updates, HW alerting, Driver updates
- Software Management: Deployment, App Management, Patch Management; Deployment and Migration; Proactive HW and SW Management; Mobile Users and Device Management; Remote Assistance / Help Desk
- LANDesk Management Suite 9.5 (LDMS) - optional - contact HP representative for part numbers
- Hardware integration with Microsoft System Center Configuration Manager: Client Integration Kit (CIK), Client Catalog, Client Driver Packs
- HP SoftPaq Download Manager (SDM)
- HP System Software Manager (SSM)
- HP BIOS Configuration Utility (BCU)
- HP Driver Packs
- HP Client Management Interface (HP CMI)

SECURITY

Trusted Platform Module (TPM) 1.2 (Common Criteria EAL4+ certified)	N/A
SATA port disablement (via BIOS)	X
Drivelock	N/A
RAID configurations	N/A
Serial, parallel, USB enable/disable (via BIOS)	X
Optional USB Port Disable at factory (user configurable via BIOS)	N/A
Removable media write/boot control	X
Power-On password (via BIOS)	N/A
Setup password (via BIOS)	X
HP Chassis (1 bay) Security Kit	X
Solenoid Hood Lock / Sensor	N/A
Support for chassis padlocks and cable lock devices	N/A

ENVIRONMENTAL & REGULATORY

ENERGY STAR® qualified models available

EPEAT® registered where applicable/supported. See www.epeat.net for registration status by country.

Low halogen (chassis, all internal components and modules)

TAA compliant

Standard Features and Configurable Components (availability may vary by country)

PORTS

I/O Ports - Standard

USB 2.0	2 (front); 4 (rear);
USB 3.0	2 (front); 1(internal)
Serial (RS-232)	1
PS/2	1 keyboard (purple) 1 mouse (green)
Video	1 VGA 1 DVI-D
Audio	Front: headphone/mic Rear: line in/out 3.5mm diameter
RJ-45 Network Interface	

I/O Ports - Optional

2nd Serial (RS-232)	1
Parallel	1
PCI Express Mini Card	N/A
MXM Graphics	N/A
mSATA	N/A
PCI Express x1 (v2.0)	3 4.2" full height 6.6" length 10W max. power
PCI Express x16 (v2.0) (wired as a x4)	1 4.2" full height 6.6" length 75W max. power
PCI Express x16 (v3.0)	N/A
Optional PCI (v2.3)	N/A

BAYS

3.5" external storage drive	1
5.25" ODD	2
Slim ODD	N/A
2.5" internal storage drive	N/A
3.5" internal storage drive	2

Standard Features and Configurable Components (availability may vary by country)

SERVICE AND SUPPORT

On-site Warranty [1]: One-year (1-1-1) limited warranty delivers one year of on-site, next business day [2] service for parts and labor and includes free telephone support [3] 24 x 7. One-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing a Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: www.hp.com/go/cpc

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured Compaq and third-party HP qualified hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

OPERATING SYSTEMS

Preinstalled

Windows 8.1 Pro (64-bit)*
Windows 8.1 (64-bit)*
Windows 7 Ultimate (32-bit)**
Windows 7 Ultimate (64-bit)**
Windows 7 Professional (32-bit)**
Windows 7 Professional (64-bit)**
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8.1 Pro)***
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8.1 Pro)***
Windows 7 Home Premium (32-bit)**
Windows 7 Home Premium (64-bit)**
Windows 7 Home Basic (32-bit)**
FreeDOS 2.0
Novell SUSE Linux Enterprise Desktop 11

For all Preinstalled operating systems HP provides Microsoft WHQL certified (where applicable) drivers on www.hp.com at the time of product announcement.

Web Support Windows 7 Enterprise (32-bit or 64-bit)

For all Supported operating systems HP performs testing of the OS, and makes available all HP value add software (OS dependent). Certified drivers are made available on www.hp.com within 30 days of product announcement.

Certified Novell SUSE Linux Enterprise Desktop 111

Red Hat Enterprise Linux 641

For all Certified operating systems HP will submit hardware to the operating system vendor for testing and certification. All drivers would be obtained from the operating system vendor, not supplied by HP. Certification will be posted by the operating system vendor.

*Not all features are available in all editions of Windows 8.1. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8.1 functionality. See http://www.microsoft.com.

**Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.

***This system is preinstalled with Windows® 7 Professional software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

[1]The following features are not supported by Novell SUSE Linux Enterprise Desktop:

- Intel Gigabit CT Desktop NIC
- Broadcom NetXtreme Gigabit Ethernet Plus
- HP Media Card Reader
- HP Client Security
- HP Blu-ray Writer playback of commercial movies
- HP 2nd serial port adapter
- Power Management features

Systems configured with Linux do not qualify for ENERGY STAR®

The following features are not supported by Red Hat Enterprise Linux 64:

Technical Specifications – Operating Systems, Software and eDocumentation

- TPM v1.2 embedded Security Chip
- Intel Gigabit CT Desktop NIC
- HP Wireless 802.11b/g/n NIC
- HP Media Card Reader
- HP Blu-ray Writer
- HP 2nd serial port Adapter
- HP USB Smart Card (CCID) Keyboard
- Power Management features

Systems configured with Linux do not qualify for ENERGY STAR®

SSOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Included	Windows 7	Windows 8.1
Security	HP Client Security: HP Drive Encryption (FIPS 140-2) HP Device Access Manager with Just In Time Authentication HP Password Manager HP File Sanitizer (SSDs and Hybrid Drives not supported) HP Disk Sanitizer External Edition[1] Microsoft Security Essentials	Disk Sanitizer External Edition[1] Microsoft Defender
MultiMedia	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)
Communication		HP Wireless Hotspot
HP Value Add	HP ePrint Driver[2] HP PageLift HP Support Assistant HP Recovery Disk Creator	HP ePrint Driver[2] HP PageLift HP Recovery Manager HP Support Assistant
3rd Party	Adobe Flash Player Box PDF Complete, Corporate Edition Skype	PDF Complete, Corporate Edition Skype
Microsoft Products	Buy Office	Buy Office

[1] Available via download

[2] Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see www.hp.com/go/eprintcenter). Requires optional broadband module. Broadband use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Separately purchased data plans or usage fees may apply. Print times and connection speeds may vary

Integrated AMD Radeon HD 8240, 8330 & 8400 Graphics

Memory	Variable and user selectable in BIOS settings
Controller Clock Speed	Variable depending on the installed APU model
Maximum Color Depth	32 bpp (8-8-8-8)
Multidisplay Support	Yes (2)
Graphics /API support	DX 11.1, Shader Model 5, UVD 4.2, VCE 2.0, OpenGL 4.2 (4.1+), OpenCL 1.2, and DirectCompute 11
Output Connectors	1 VGA and 1 DVI-D (with HDCP support)

Supported Display Resolutions and Refresh Rates

NOTE: Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Supported Resolution	VGA Connection	DVI-D Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	N/A
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	N/A
2560 x 1600	N/A	N/A

* Only supported on displays connected to the external DisplayPort connector.

AMD Radeon HD 8470 Graphics Card

Form Factor	Full Height
Graphics Controller	AMD Radeon HD 8470
Core Clock	775MHz
Memory Clock	900MHz
Memory	2GB, DDR3, 64-bit wide
Bus Type	PCIe Gen2
Max. Power	< 30W
Power Source Support	12V and 3.3V
3D API Support	DX11
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600 Analog 2048 x 1536
Supported Graphics APIs	DX11, OpenGL, full 1080p BD (H264) playback in hardware, HDMI 1.4 support

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Refresh Rates
800 x 600	60 Hz
1024 x 768	60 Hz
1280 x 720	60 Hz
1280 x 768	60 Hz
1280 x 1024	60 Hz
1360 x 768	60 Hz
1440 x 900	60 Hz
1600 x 900	60 Hz
1680 x 1050	60 Hz
1920 x 1080	60 Hz

NVIDIA NVS 310 Graphics Card

Introduction

The NVIDIA® NVS™ 310 Graphics Card is a PCI Express low profile form factor graphics add-in card targeted as an active low cost graphics solution for the corporate business and enterprise markets.

The NVIDIA® NVS 310 graphics card is an ideal solution for customers requiring a small form factor graphics add-in card for either standard or small form factor PC designs.

Performance and Features

The NVIDIA® NVS 310 Graphics Card offers 512 MB of ultrafast DDR3 memory and is capable of supporting up to 2 displays.

DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA.

For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.

Form Factor

Low Profile: 2.713 × 6.15 in

Graphics Controller

NVIDIA® NVS 310

Memory Clock

875MHz

Memory Size

512 MB DDR3

Memory Bandwidth

14 GB/s

Max. Power

19.5W

Display Max. Resolution

Up to 2560 x 1600 (digital display) per display

Display Output

Up to 2 displays in the following configurations

DisplayPort output:

- Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card
- Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort Multi-Stream topology technology.

Technical Specifications - Graphics

DVI-D output:	• Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors
HDMI output:	• NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors
VGA display output:	• Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	DisplayPort to VGA	DisplayPort to DVI-D	DisplayPort to HDMI	DisplayPort
640 x 480	85	60	60	60
800 x 600	85	60	60	60
1024 x 768	85	60	60	60
1280 x 720	85	60	60	60
1280 x 1024	85	60	60	60
1440 x 900	75	60	60	60
1600 x 1200	60	60	60	60
1680 x 1050	60	60	60	60
1920 x 1080	60-R	60-R	60	60
1920 x 1200	60-R	60-R		60
1920 x 1440				60
2048 x 1536				60
2560 x 1600				60

Technical Specifications - Graphics

NVIDIA NVS 315 1GB PCIe x 16 Graphics Card

Introduction	Get efficient dual-display graphics performance in a PCI Express low-profile graphics card with the NVIDIA NVS 315 PCIe x16 1 GB Graphics Card, an ideal desktop graphics solution for professional business and commercial applications.
Performance and Features	The NVIDIA® NVS 315 Graphics Card offers 1 GB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.
Form Factor	Low Profile: 2.713 × 6.15 in
Graphics Controller	NVIDIA® NVS 315
Memory Clock	875MHz
Memory Size	512 MB DDR3
Memory Bandwidth	14 GB/s
Connectors	DMS-59 , with support for dual VGA, dual DVI or dual Display Port with the appropriate adapter cable
Display Max. Resolution	Up to 2048 x 1536 VGA; 1920 x 1200 DVI; 2560 x 1600 DisplayPort

Display Output	Up to 2 displays in the following configurations
	• Dual DVI :
	  ○ Drives two DVI displays using optional HP DMS59 DVI Dual-head Connector Cable DL139A
	• Dual DisplayPort :
	  ○ Drives two DisplayPort using optional HP DMS-59 to Dual DisplayPort kit XP688AA
	• Dual VGA :
	  ○ Drives two analog using the included HP DMS-59 to Dual VGA Cable

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Maximum Refresh Rates (Hz) by Connection	
	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	60

Technical Specifications - Graphics

1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60*
2560 x 1600	N/A	60*

* Display Port Only

NVIDIA GeForce GT630 Graphics Card

Introduction

The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Card Graphics Card provides a full height, PCI Express x16 graphics add-in card solution based on the NVIDIA Kepler Architecture GPU. The card is designed to support three display connections through its DVII, and two DisplayPort connectors.

An ideal solution for desktop PC customers seeking enhanced 2D and advanced 3D graphics performance, the NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards are an excellent choice for business users who want run multiple displays from a single graphics board. Engage in Web conferencing or video or photo editing, while improving your everyday business PC experience with better graphics and excellent visual display quality.

Performance and Features

The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards deliver superior PCI Express (PCIe) Gen 3 features including:

- Unprecedented flexibility for new applications and enhanced performance
- Support for NVIDIA surround technology
- Run multiple displays from a single graphics card
- Full 16 lane PCIe Generation 3 bus support with peak bandwidth support
- Wireless Display ready for future support

Form Factor PCIe x16 Card

Graphics Controller NVIDIA Kepler Architecture GPU

Core Clock 875 MHz

Memory Clock 891 MHz

Memory Size 2 GB DDR3 128 bit

Memory Bandwidth 28.5 GB/s

Display Max. Resolution 2560 x 1600 digital, 2048 x 1536 analog

Display Output Integrated 400 MHz RAMDAC

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Maximum Refresh Rates (Hz)	
	Analog Connection	Digital Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	60
2048 x 1536	75	60
2560 x 1600	N/A	60

AMD Radeon HD 8350 1GB PCie x16 DH Graphics Card

Introduction	Get stable 2D and advanced 3D graphics performance from the AMD Radeon HD 8350 1 GB PCIe x16 DH Graphics Card, a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8350 GPU, great for Web conferencing or video and photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8350
Core Clock	GPU engine operates at 523 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	875 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 1920 x 1200 Analog 2048 x 1536

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	N/A
2560 x 1600	N/A	N/A

AMD Radeon HD 8490 1GB PCie x16 Graphics Card

Introduction	Get impressive graphics and high resolution dual-display performance in a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8490 Graphics Processor. Improve your everyday PC, Web conferencing, and video or photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8490
Core Clock	GPU engine operates at 875 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	900 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600 Analog 2048 x 1536

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

	Analog Connection	Digital Connection
300 x 200	85	60
320 x 240	85	60
400 x 300	85	60
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 900	85	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60
2560 x 1600	N/A	60

Technical Specifications - Hard Disk and Solid State Storage

Introduction:

HP Serial Advanced Technology Attachment (SATA) Hard Drives maximize the performance of HP Business PCs by providing the technologies to meet your increasing storage demands with high-capacity drives offering superior reliability and performance.

SATA provides faster data transfer speeds, better system cooling airflow, more bandwidth, more headroom for speed increases in future generations and better data integrity. A next-generation technology, the SATA interface connects hard drives to the PC platform enabling easy aggregation of multiple hard drives into a single PC. This offers you the additional benefits of dedicated bandwidth, the ability to more easily identify device failures and scalability. The HP ProDesk 405 G1 Series Business PC supports the latest SATA 6.0Gb/s specification.

SMART IV Technology

Self Monitoring Analysis and Reporting Technology (SMART) hard drive technology allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables the intelligent manageability or management software to generate a fault alert. While the current versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has promoted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a 2 byte parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This unique parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive.

Smart IV is also known as IOEDC: I/O Error Detection Code.

Native Command Queuing

NCQ or Native Command Queuing is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), which allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. Enabling NCQ features in the hard drive requires AHCI support from the host system BIOS, controller, and driver. AHCI support is typically implemented in RAID configurations.

NOTE: GB = 1 billion bytes. Actual available capacity is less.

Technical Specifications - Hard Disk and Solid State Storage

HP 1-TB SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)

Formatted Capacity	1 TB	
Spindle Speed	5,400 rpm +/- 0.2%	
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.374 +/-.008 in (9.5 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.254 lb/115 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

HP 500 GB SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)

Formatted Capacity	500 GB	
Spindle Speed	5,400 rpm +/- 0.2%	
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.268 +/-.008 in (6.8 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.209 lb/95 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

Technical Specifications - Hard Disk and Solid State Storage

HP 128 GB Solid State Drive

Unformatted Capacity	128 GB*	
Architecture	Multi Level Cell (MLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.16 lb (73 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 450 MB/ss
	Sustained Sequential Write:	Up to 260 MB/s
	Random Read (4KB):	up to 46K IOPs
	Random Write (4KB):	up to 56K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.5 V; Max 5.5 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

* For solid state disk drives, GB means 1 billion bytes. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity will vary by content

** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

HP 256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive

Unformatted Capacity	256,186,209,271 bytes	
Architecture	Self-Encrypting (SED) Solid State Drive with 25nm MLC NAND Flash and SATA interface	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
NAND Flash	25nm MLC NAND Flash	
Height	.275 in/7mm	
Width	2.75 in/69.85 mm	
Length	3.95 in/100.5 mm	
Weight	0.161 lb (73 g)	
Bandwidth Performance	Sustained Sequential 128k Read:	Up to 450 MB/ss
	Sustained Sequential 128k Write:	Up to 260 MB/s
	Random 4k Read:	up to 46K IOPs
	Random 4k Write:	up to 56K IOPs
Latency	Read:	55 µs
	Write:	55 µs
Power	SATA power consumption:	160 mW (active average); <85 mW (idle average)

Technical Specifications - Hard Disk and Solid State Storage

Useful Drive Life	72TB written, up to 40GB/day for 5 years	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/1 ms

HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	1,000,204,886,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	32 MB	
Logical Blocks	1,953,525,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP 2-TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Unformatted Capacity	2 TB	
Rotational Speed	7,200 rpm	
Interface	SATA 6Gb/s NCQ	
Cache, Multisegmented (MB)	64 MB	
Seek Time (average)	Read	<8.5 ms
	Write	<9.5 ms
Height	1.028 in/26.11 mm	
Width	4.0 in/101.6 mm	
Depth	5.787 in/146.99 mm	
Weight	1.38 lb/626 g	
Operating Temperature	32° to 140° F (0° to 60° C)	

HP Blu-ray BDXL Writer Drive

Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA		
Disc capacity	Blu-ray: 128 GB QL, 100 GB TL, 50 GB DL or 25 GB standard DVD: 8.5GB DL or 4.7GB standard		
Dimensions W x H x D (max)	5.8 x 1.7 x 7.1 in (14.8 x 4.2 x 18.0 cm) max		
Weight (max)	2.1 lb (950g)		
Performance	**CD-ROM Read Access time**	Random	140 ms (typical)
		Full Stroke	230 ms (typical)
	DVD-ROM Read Access time	Random	150 ms (typical)
		Full Stroke	240 ms (typical)
	BD-ROM Read Access time	Random	250 ms (typical)
		Full Stroke	350 ms (typical)
	Startup Time	(Time to drive ready from tray loading)	
		BD-ROM (SL/DL)	28S / 28S
		BD-R (SL/DL/TL/QL)	28S / 28S / 40S / 40S
		BD-RE (SL/DL/TL)	28S / 28S / 40S
		DVD-ROM (SL/DL)	18S / 18S
		DVD-R (SL/DL)	25S / 25S
		DVD-RW	25S
		DVD+R (SL/DL)	25S / 25S
		DVD+RW	25S
		DVD-RAM	35S
		CD-ROM	15S
	CD Read speeds	CD-ROM up to 40X CD-R up to 40X CD-RW up to 40X	
	DVD Read speeds	DVD-RAM up to 5X DVD+/-RW up to 10X DVD+/-R up to 16X DVD+/-R DL up to 8X DVD-ROM up to 16X DVD-ROM DL up to 8X	
	Blu-ray Read speeds	BD-ROM (SL/DL) up to 8X BD-R (SL/DL) up to 8X BD-R (TL/QL) up to 6X BD-RE (SL/DL) up to 6X BD-RE TL up to 4X	
	CD Write speeds	CD-R up to 40X CD-RW up to 24X	

Technical Specifications - Removable Storage

	DVD Write speeds	DVD+/-R up to 16X DVD+/-R DL up to 8X DVD+RW up to 8X DVD-RW up to 6X DVD-RAM up to 5X
	Blu-ray Write speeds	BD-R (SL/DL) up to 6X BD-R (TL/QL) up to 4X BD-RE (SL/DL/TL) up to 2X
Power	**Source**	SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC -1200 mA typical, 1500 mA maximum 12 VDC -1000 mA typical, 1500 mA maximum
Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

HP SuperMulti DVD Writer Drive

Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA		
Dimensions W x H x D (max)	5.8 x 1.7 x 6.9 in (14.8 x 4.2 x 17.5 cm) max		
Weight (max)	2.1 lb (950g)		
Performance	CD-ROM Read Access	Random	120 ms typical
		Full Stroke	200 ms typical
	DVD-ROM Read Access	Random	130 ms typical
		Full Stroke	240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
	DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)

Technical Specifications - Removable Storage

		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD+/-R	Up to 21600 KB/s (16X)
		DVD+/-R DL	Up to 10800 KB/s (8X)
		DVD+/-RW	Up to 10800 KB/s (8X)
		DVD-RAM	Up to 6750 KB/s (5X)
	CD Media Write Transfer	CD-R	Up to 6000 KB/s (40X)
		CD-RW	Up to 600 KB/s (4X)
		CD-RW (High speed)	Up to 1500 KB/s (10X)
		CD-RW (Ultra speed)	Up to 3600 KB/s (24X)
	DVD Media Write Transfer	DVD+/-R	Up to 21600 KB/s (16X)
		DVD+/-R DL	Up to 10800 KB/s (8X)
		DVD+RW	Up to 10800 KB/s (8X)
		DVD-RW	Up to 8100 KB/s (6X)
		DVD-RAM	Up to 6750 KB/s (5X)
Media Compatibility	**Media**	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	Yes
	CD-RW	Yes	Yes
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	Yes
	DVD+/-R	Yes	Yes
	DVD+/-R DL	Yes	Yes
	DVD+/-RW	Yes	Yes
Power	**Source**	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
	DC Current	5 VDC	1000 mA (typical) 1600 mA (max.)
		12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental (all conditions non-condensing)	**Operating Temperature**	41° to 122° F (5° to 50° C)	
	Storage Temperature	-22° F to 140° F (-30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	

HP DVD-ROM Drive

Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA		
Dimensions W x H x D (max)	5.8 x 1.7 x 6.9 in (14.8 x 4.2 x 17.5 cm) max		
Weight (max)	2.1 lb (950g)		
Performance	CD-ROM Read Access	Random	120 ms typical
		Full Stroke	200 ms typical
	DVD-ROM Read Access	Random	130 ms typical
		Full Stroke	240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
	DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD+/-R	Up to 21600 KB/s (16X)
		DVD+/-R DL	Up to 10800 KB/s (8X)
		DVD+/-RW	Up to 10800 KB/s (8X)
		DVD-RAM	Up to 6750 KB/s (5X)

Media Compatibility	**Media**	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+/-R	Yes	No
	DVD+/-R DL	Yes	No

Technical Specifications - Removable Storage

	DVD+/-RW	Yes	No
Power	**Source**	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
	DC Current	5 VDC	1000 mA (typical) 1600 mA (max.)
		12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental (all conditions non-condensing)	**Operating Temperature**	41° to 122° F (5° to 50° C)	
	Storage Temperature	-22° F to 140° F (-30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	

Technical Specifications – Memory

Platform Memory Support

- The Microtower platform supports up to two (2) industry-standard DDR3-SDRAM DIMMs.

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.
NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Realtek RTL8151GH-CG GbE LOM Network Adapter

Connector	RJ-45
System Interface	Integrated on PCA
Controller	Realtek RTL8151GH-CG Gigabit Ethernet Controller
Memory	16 KB FIFO packet buffer memory
Data rates supported	10/100/1000 Mbps
IEEE Compliance	802.1P 802.1Q 802.3 802.3ab 802.3az 802.3u
Bus architecture	PCI Express
Data transfer mode	PCIe-based interface for active state operation (S0 state)
Power requirement	Requires 3.3V and 1V or just 3.3V with integrated regulators Power consumption 0.425 W
Network transfer mode	Full-duplex Half-duplex (not supported for the 1000BASE-T transceiver)
Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
Environmental	Operating Temperature: 32° to 158° F (0° to 70° C) Operating Humidity: 60% RH
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, Advanced cable diagnostic

Intel® Ethernet I210-T1 Gigabit Network Adapter

Connector	RJ-45
System Interface	PCI Express x1
Controller	Intel® I210 Gigabit Ethernet Controller
Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
Data rates supported	10/100/1000 Mbps
IEEE Compliance	802.1P 802.1Q 802.2 802.3 802.3AB 802.3u 802.3x flow control
Bus architecture	PCI-E 2.1

Technical Specifications - Networking and Communications

Data path width	X1, 250 MB/s, Bi-directional interface
Data transfer mode	Bus-master DMA
Hardware certifications	FCC, B, CE, TUV-c, TUVus Mark Canada and United States, TUV-GS Mark for European Union
Power requirement	Aux 3.3 V, 3.0 Watts in 1000 base-T and 1.0 Watts in 100 Base-T
Boot ROM support	Yes
Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI Bus)
Environmental	Operating Temperature: 32° to 131°F (0° to 55° C) Operating Humidity: 85% at 131° F (55° C)
Management	WOL, PXE, DMI, WFM 2.0

Intel Dual Band Wireless-N 7260 802.11 a/b/g/n (2x2) Wireless Network Interface Connection

Wireless LAN Standards	IEEE 802.11a/b/g/n	
Interoperability	Wi-Fi certified (802.11 a/b/g/n WMM, WPA, WPA2 and WPS) Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP. NOTE: WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n	4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Antenna Structure	2 transmit; 2 receive (2x2)	
Data Rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)	
Modulation	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM	
Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI	

Technical Specifications - Networking and Communications

	Note: Check latest software/driver release for updates on supported security features.
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between band Access Points
Output Power	• 2.4G: +13.5dBm minimum • 5G: +12dBm minimum Note: Maximum output power may vary by country according to local regulations.
Power Consumption	Transmit: 2.0 Watts Receive: 1.6 Watts Idle mode: 250 mW (WLAN associated) In Power Save Polling mode and on battery power. Idle mode: 100 mW (WLAN unassociated) Radio off: 100 mW (WLAN unassociated)
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity Note: Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).	802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) 802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) 802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps)
Antenna Connections	2 U.FL type connectors (output impedance of 50 ± 2 ohms)
Form Factors	PCI-Express Half-MiniCard
Weight	0.0068 lb (3.1 g)
Dimensions	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 mm)
Operating Voltage	3.3V +/- 9%
Temperature	**Operating:** 14° to 158° F (-10° to 70° C) **Non-operating:** -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** 10% to 90% (non-condensing) **Non-operating:** 5% to 90% (non-condensing)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON

Technical Specifications - Audio

High Definition Audio

Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC221 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal. All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes
Full Duplex	Yes

Technical Specifications – Keyboards and Pointing Devices

HP USB Keyboard

	Keys	104, 105, 106, 107, 109 layout (depending upon country)
Physical characteristics	Dimensions (L x W x H)	18.12 x 6.47 x 0.96 in (46.03 x 16.43 x 2.44 cm)
	Weight	2 lb (0.9 kg)
	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
Electrical	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
Mechanical	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
Environmental	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	30 in (76.2 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
Ergonomic compliance	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, KC	

Technical Specifications – Keyboards and Pointing Devices

Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Keyboard

Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.22 x 6.47 x 1.1 in (46.28 x 16.43 x 2.79 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	PS/2 6-pin mini din connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Microsoft PC 99 - 2001	Functionally compliant
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	50-dBA maximum sound pressure level
	Operating temperature	32° to 104° F (0° to 40° C)
	Non-operating temperature	-22° to 149° F (-30° to 65° C)
	Operating humidity	15% to 80% (non-condensing at ambient)
	Non-operating humidity	15% to 90% (non-condensing at ambient)
	Operating shock	N/A
	Non-operating shock	65 inch 2.9 ms, six surface; 30g 266 inch/second; 50g 266 inch/second six surface
	Operating vibration	2-g peak acceleration

	Non-operating vibration	Starting at 5 Hz, vary the frequency of vibration from 5 to 500 Hz and back to 5 Hz at a Logarithmic sweep rate of 1 octave per minute.
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	29.93 in (76 cm) on concrete, 16-drop sequence
Approvals	CUL, ICES-003 Class B, FCC, CE Mark,TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP USB Smart Card (CCID) Keyboard

Key Benefits:

- Protects against unauthorized access with smart card technology
- Delivers even greater security when combined with a HP ProtectTools smart card and the HP ProtectTools Security Software
- Combination of username and password or pin with a smart card or security token
- Secures online transactions using digital signatures and certificates
- Conforms to industry standards for ease of setup and use
- Delivers long product life and quiet operation with high-impact materials and lubricated keys
- Spill drain feature

Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country
	Form factor	USB basic smart card keyboard
	Colors	Carbonite/Silver
	Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
	Languages	30+ available
Mechanical	Keycaps	Standard design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)

Technical Specifications – Keyboards and Pointing Devices

Environmental	Non-operating temperature	-22° to 140° F (-30° to 60° C)	
	Operating humidity	10% to 90% (non-condensing at ambient)	
	Non-operating humidity	20% to 80% (non-condensing at ambient)	
	Operating shock	40 g, six surfaces	
	Non-operating shock	80 g, six surfaces	
	Operating vibration	2-g peak acceleration	
	Non-operating vibration	4-g peak acceleration	
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence	
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence	
SmartCard Function	Support	All ISO 7816 smart cards	
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)	
	Chipset	SCM STCIII	
	Standard APIs supported	PC/SC, EMV2000, CT-API	
	Power	USB Port	
		Short circuit detection (protects smart card and reader)	
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)	
		Supports 3-V and 5-V cards	
	Power consumption	100-mA maximum draw	
	Communication	From card	9600 bps to 330,000 bps
		From computer	12 Mbps (USB transfer speed)
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	CCID protocol	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	2004/108/EC
		USA	USAFCC part 15
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF		
Ergonomic Compliance	ISO 9241-4, TUVGS		
Kit Contents	Keyboard, I/O Security and Documentation CD, warranty card		

HP USB PS/2 Washable Keyboard

Physical Characteristics	Keys	104 (US) layout or 105 (EU) layout – depending upon country
	Dimensions (L x W x H)	17.67x 6.62 x 1.38 in (449 x 168 x 35 mm)
	Weight	1.7 lb (0.77 kg) minimum
	Operating voltage	+ 5VDC ±5%

Technical Specifications – Keyboards and Pointing Devices

Electrical	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
Mechanical	Microsoft® PC 99 - 2001	Functionally compliant
	Keycaps	Stepped -profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	7 ft (2.2 m)
Environmental	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Operating system support	Windows® 7, Windows Vista, Windows XP Professional	
Approvals	UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP Wireless Keyboard and Mouse

Keyboard	Dimensions (H x L x W)	1.09 x 18.1 x 6.47 in (27.87 x 460.3 x 164.3 mm)
	Weight – Without Two AA Alkaline Batteries	1.94 lb (880 g)

Technical Specifications – Keyboards and Pointing Devices

Mouse	Dimensions (H x L x W)	1.46 x 4.53 x 2.47 in (37 x 115 x 62.9 mm)
	Weight – Without Two AA Alkaline Batteries	0.15 lb (67 g)
Receiver	Dimensions (H x L x W)	0.33 x 1.79 x 0.72 in (8.4 x 45.5 x 18.4 mm)
	Weight	0.21 oz (5.9 g)
	Cable Length – Minimum	6 ft (1.8 m)
	Range	32.8 ft (10 m)
System Requirements	Windows 7 Home Basic*, Windows 7 Home Premium*, Windows 7 Professional Edition 32*, Windows 7 Professional Edition 64*, Windows 7 Ultimate Edition 32*, Windows 7 Ultimate Edition 64* Windows Vista or Windows XP Available USB port for the receiver CD-ROM Drive *This system may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.	
Approvals	Product Safety	UL; CSA /TUV (Europe only); CE Mark; CB Report
	Ergonomics	ANSI; ISO (Europe only); GS Mark (Germany only)
	EMC	FCC; CE; ACA (-tick); BSMI; KC ; VCCI
	CE Mark	EN 55022:2010; EN 55024; EN 301489-1; EN 61000
	Design Guidelines for PCs	PC 99 - connector overmold colors; PC 2001 - full functionality
	Telecom	All local telecom requirements and approvals for intended markets
	USA	FCC Title 47 CFR, Par 15, Subpart C; other local requirements
	Country Support	US, Belgium, Switzerland, Spain, Denmark, Netherlands, France, Germany, Italy, Portugal, Sweden, Norway, Finland, UK, Poland, Czech Republic, Turkey, Greece, Austria, Bulgaria, Cyprus, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, Romania, Slovakia, Slovenia, Vietnam, HK, Australia, NZ, Malaysia, Singapore, Indonesia, Philippines, Thailand, Canada, China, Japan, Korea, Taiwan, India, Venezuela, Ecuador, Russia, Ukraine, Israel, Croatia, United Arab Emirates, Peru, Brazil, Chile, Argentina, Mexico, South Africa, and up to 193 countries worldwide.
Environmental	Keyboard contains 25% post-consumer recycled plastic material	

HP PS/2 Mouse

Dimensions (H x L x W)	1.46 x 2.48 x 4.53 in (3.70 x 6.29 x 11.50 cm)

Technical Specifications – Keyboards and Pointing Devices

Weight	3.53 oz (100g; +10g/- 5 g)	
Environmental	Operating temperature	-32° to 104°F (0° to 40° C)
	Non-operating temperature	-4° to 140°F (-20° to 60° C)
	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	800 DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	±15%
	Switch actuation	65±20 gf
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	80 km
	Cable length	6 ft (1.8 m)
Scroll wheel	Microsoft PC99 - 2001	Mechanically compliant
	Width	6 mm
	Diameter	22.5 ± 0.2 mm
	Maximum rotation force	50 gf-cm
	Switch type	Light force micro-switch

	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	UL/cUL, FCC, CE Mark, TUV/GS, VCCI, KCC, BSMI, C-Tick	

HP USB Mouse

Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)
Weight	0.22 lb (0.10 kg)
Cable length	70.9 in (180 cm)
System requirements	Available USB port

HP USB 1000dpi Laser Mouse

Dimensions (H x L x W)	1.47 x 4.53 x 2.47 in (37.3 x 114.97 x 62.86 mm)	
Weight	3.360 oz (102g)	
Cable length	70.9 in (180 cm)	
System requirements	Available USB port	
Environmental	Operating Temperature	32° to 104° F (0° to 40° C)
	Non-operating Temperature	-4° to 140° F (-20° to 60° C)
	Operating Humidity	10% to 90% (non-condensing at ambient)
Mechanical	Resolution	1000dpi
	Tracking Speed	45 cm/sec
	Cable Length	70.9 in (180 cm)

Technical Specifications – Keyboards and Pointing Devices

HP USB PS/2 Washable Mouse

Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)	
Weight	4.44 oz (126 g)	
Environmental	Operating temperature	–32° to 104°F (0° to 40° C)
	Non-operating temperature	–4° to 140°F (–20° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	10% to 90% non-condensing
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector or USB
	ESD	CE level 2 8 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC99 – 2001	Functionally compliant
Mechanical	Resolution	1000 ± 20% DPI
	Tracking speed	14 in/s (35.56 cm/s) maximum
	Acceleration	2 g
	Switch actuation	70 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Cable length	8.8 ft total 70 cm+ 2m extension
	Microsoft PC99 – 2001	Mechanically compliant
Scroll wheel	Width	6 mm
	Diameter	1 in (25.4 mm)
	Maximum rotation speed	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	3 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory approvals	Compliant	FCC, CE Mark, ICES-003-B, IP66/NEMA4X

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply

Standard Efficiency	300W active PFC (230 VAC input only)
High Efficiency* 80 PLUS Bronze	300W active PFC 82/85/82% efficient at 20/50/100% load (115V) 82/85/82% efficient at 20/50/100% load (230V)
Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	200 - 240 VAC (300W active PFC) 90 - 240 VAC
Rated Line Frequency	50/60 Hz
Operating Line Frequency Range	47 - 63 Hz
Rated Input Current	4A
Rated Input Current with Energy Efficient* Power Supply	4A
Current Leakage (NFPA 99)	<900uA / 230Vac (300W PSU)
Power Supply Fan	80mm Fan (300W PSU)
Power cord length	6.0 ft. (1.83 m)
External Power Adapter Dimensions	N/A

Technical Specifications – Power

Total Cord Length	N/A

*High efficiency power supply is a requirement for ENERGY STAR® qualification in conjunction with a select range of processors and modules

Technical Specifications – Weights & Dimensions

Weights & Dimensions

(configured with 1 HDD & 1 ODD)

Chassis (W x H x D)	182.88 x 357 x 402 mm 7.2 x 14.05 x 15.82 in
System Volume	24.66 L
System Weight*	7.148 kg 15.75 lb
Max Supported Weight (desktop orientation)	N/A
Tower Stand (H x W x D)	N/A
Packaged (H x W x D)	535 x 289 x 500 mm 21.06 x 11.37 x 19.68 in
Shipping Weight*	Est. = ~10.7 kg (packaged) ~23.58 lb
Palletization Profile	4-units per layer 8-layer max. 32-units per pallet

Management Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
    - 2 - processor thermal protection activated
    - 3 - processor not installed
    - 4 - power supply failure
    - 5 -- memory error
    - 6 - video error
    - 7 - PCA failure (ROM detected failure prior to video)
    - 8 - invalid ROM, bootblock recovery mode
    - 9 - system not fetching code
    - 10 - system hang while loading an option ROM
- HP PC Hardware Diagnostics UEFI:
  - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- 5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal
- Green Pull Tabs, and Quick Release Latches for easy Identification

Technical Specifications – Miscellaneous Features

Additional Features	Description
Towerable Orientation	Product can be oriented as either a desktop (horizontal) or a tower (vertical)
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
Drive Protection System	DPS Access through F10 Setup during Boot A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted
SMART I - Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II - Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III - Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry Detects errors in Read/Write buffers on HDD cache RAM
SMART IV - End-to-End CRC for hard drives	Interface in F10 setup provides confirmation of SMART IV support.

Environmental Data

Eco-Label Certifications & Declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- IT ECO declaration
- US ENERGY STAR®
- EPEAT Gold registered in the United States. See http://www.epeat.net for registration status in your country.

Tower

System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Ultra-slim Desktop model is based on a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Energy Consumption (in accordance with US ENERGY STAR® test method)

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 60Hz
Normal Operation	21.27 W	21.00 W	21.35 W
Sleep	0.96 W	0.96 W	0.89 W
Off	0.21 W	0.27 W	0.21 W

NOTE:
Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family . HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation*

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 60Hz
Normal Operation	73 BTU/hr	72 BTU/hr	73 BTU/hr
Sleep	3 BTU/hr	3 BTU/hr	3 BTU/hr
Off	1 BTU/hr	1 BTU/hr	1 BTU/hr

***NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Typically Configured - Idle	4.0	28
Fixed Disk - Random writes	4.1	28

Longevity and Upgrading

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include:

- 8 USB ports
- 2 memory slots
- 3 Mini PCIe half-length slot
- 1 Mini PCIe slot
- 1 internal bay supporting either one 2.5" or one 3.5" hard drives (HDD/SSD/SED/SSHD)
- 1 5.25" external supporting optical drive

Spare parts are available throughout the warranty period and or for up to "5" years after the end of production.

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:
Mercury greater the1ppm by weight
Cadmium greater than 20ppm by weight

Battery size: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product contains 10.8% post-consumer recycled plastic (by wt.)
- This product is 91.8% recycle-able when properly disposed of at end of life.

Packaging Materials

- External:
  - PAPER/Corrugated 2380 g
- Internal:
  - PLASTIC/EPE (Expanded Polyethylene) 185 g
  - PLASTIC/Polyethylene low density 45 g
  - PLASTIC/Polypropylene 15 g
- The PAPER/Corrugated packaging material is made from 55% recycled content.
- The PLASTIC/EPE (Expanded Polyethylene) packaging materials contains at least 19.5% recycled content.
- The PLASTIC/Polyethylene low density packaging materials contains at least 19.5% recycled content.
- The PLASTIC/Polypropylene packaging materials contains at least 19.5% recycled content.

Common to all Form Factors

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at: http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde

Technical Specifications – Environmental Data

- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:

Global Citizenship Report
http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
Eco-label certifications
http://www8.hp.com/us/en/hp-information/environment/ecolabels.html
ISO 14001 certificates:
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf
and
http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

Options and Accessories (sold separately)

Communication Devices

	Part Number
Intel Ethernet I210 - T1 Gbe NIC	E0X95AA
Intel 6205 802.11 a/b/g/n PCIe x1 NIC	E0X93AA

Graphics Solutions

	Part Number
AMD Radeon HD 8350 Graphics (PCIe x16)	E1C63AA
AMD Radeon HD 8490 Graphics Card	E1C64AA
Nvidia NVS 310 Graphics (PCIe x16)	A7U59AA
Nvidia NVS 315 Graphics (PCIe x16)	E1C65AA
HP DisplayPort Cable Kit	VN567AA
HP DisplayPort To Dual Link DVI-D Adapter	NR078AA
HP DisplayPort To DVI-D Adapter	FH973AA
HP DisplayPort to HDMI Adapter	BP937AA
HP DisplayPort to VGA Adapter	AS615AA
HP DMS-59 to Dual DVI Cable	DL139A
HP DMS-59 to Dual DisplayPort Adapter	XP688AA

Data Storage Drives and Accessories

	Part Number
HP 2TB 7200rpm SATA 6.0Gb/s Hard Disk Drive	
HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	QK555AA
HP 1-TB 10K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive	C2T91AA
HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive	QK554AA
HP 128-GB SATA 3.0Gb/s Solid State Drive	QV063AA
HP 160-GB SATA 3.0Gb/s Solid State Drive	QV064AA*
HP 500-GB SATA 3.0Gb/s Solid State Hybrid Drive	E1C62AA
HP Slim Removable SATA Hard Drive Enclosure (frame & carrier)	C1N41AA
HP Slim Removable SATA Hard Drive Enclosure (carrier only)	E3F39AA
HP Chassis (1bay) Security Kit	AR639AA

*Not available in all regions.

Options and Accessories (sold separately)

Input Devices

	Part Number
HP USB Keyboard	QY776AA
HP USB Gray Keyboard	B6B64AA
HP USB Smart Card (CCID) Keyboard	BV813AA
HP USB Keyboard and Mouse Kit	B1T09AA
HP USB Washable Keyboard	VF097AA
HP USB and PS/2 Washable Mouse	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	BU207AA
HP PS/2 Mouse	QY775AA
HP USB Mouse	QY777AA
HP USB 1000dpi Laser Mouse	QY778AA
HP Wireless Keyboard and Mouse Combination	QY449AA

System Memory

	Part Number
HP 4GB DDR3-1600 (PC3-12800) DIMM	B4U36AA
HP 8GB DDR3-1600 (PC3-12800) DIMM	B4U37AA

Multimedia Devices

	Part Number
HP Slim DVD-ROM Drive	VP033AA
HP Slim SuperMulti DVD Writer Drive	QS209AA
HP USB HD 720P v2 Business Webcam	D8Z08AA
HP Business Headset	QK550AA

Removable Media Storage

	Part Number
HP 14-in-1 Media Card Reader (available Dec. 2013)	TBD

Security Devices

	Part Number
HP SFF Wall Mount/Security Sleeve	VN570AA
HP UltraSlim Cable Lock	H4D73AA

Stands and Accessories

	Part Number
HP Integrated Work Center Stand (SFF)	QP897AA
HP 405 Tower Bezel Kit	E1C66AA
HP Serial Port Adapter (RS-232 compatible)	PA716A
HP Parallel Port Kit	KD061AA
HP PCI Expansion Kit	E1V16AA

Options and Accessories (sold separately)

Business Monitors

	Part Number
HP ProDisplay P191	C9E54AA
HP ProDisplay P201	C9F26AA
HP ProDisplay P221	C9E49AA
HP EliteDisplay E201	C9V73AA
HP EliteDisplay E221	C9V76AA
HP EliteDisplay E231	C9V75AA
HP LA2405x	D0P36AA
HP EliteDisplay E271i	D7Z72AA
HP EliteDisplay E221c	D9E49AA
HP L2206tm	B0L55AA

LANDesk Software (E-Delivery)

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